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Future Electric Utility Regulation Series Report #5: **Recovery of Utility Fixed Costs: Utility, Consumer, Environmental and Economist Perspectives**

July 8, 2016

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John Howat, National Consumer Law Center
Ralph Cavanagh, Natural Resources Defense Council
Severin Borenstein, University of California, Berkeley

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Agenda

- About the series
- Webinar housekeeping items
- Four perspectives on fixed utility costs (15 min. each)
  - Utility perspective – Wood and Hemphill
  - Consumer perspective – Howat
  - Environmental perspective – Cavanagh
  - Economist perspective – Borenstein
- Q&A (25 min.)

Future Electric Utility Regulation Series

- A new series of reports from Lawrence Berkeley National Laboratory taps leading thinkers to grapple with complex regulatory issues for electricity
- Unique point-counterpoint approach highlights different views on the future of electric utility regulation and business models and achieving a reliable, affordable and flexible power system
- Primary funder: DOE Office of Electricity Delivery and Energy Reliability, National Electricity Delivery Division
- Primary funder for report #5: DOE Office of Energy Policy & Systems Analysis
- Reports published or underway:
  1. *Distributed Energy Resources (DERs), Industry Structure and Regulatory Responses*
  2. *Distribution Systems in a High DER Future: Planning, Market Design, Operation and Oversight*
  3. *Performance-Based Regulation in a High DER Future*
  4. *Distribution System Pricing With DERs*
  5. *Recovery of Utility Fixed Costs: Utility, Consumer, Environmental and Economist Perspectives* – **Today's topic**
  6. *The Future of Electricity Resource Planning* (draft under review)
- Additional reports forthcoming: **feur.lbl.gov**
- Expert advisory group (next slide) provides guidance and review

FUTURE ELECTRIC
Utility Regulation

Advisory Group

- Janice Beecher, Institute of Public Utilities, Michigan State University
- Ashley Brown, Harvard Electricity Policy Group
- Paula Carmody, Maryland Office of People's Counsel
- Ralph Cavanagh, Natural Resources Defense Council
- Commissioner Michael Champley, Hawaii Public Utilities Commission
- Steve Corneli, independent adviser
- Commissioner Mike Florio, California Public Utilities Commission
- Peter Fox-Penner, Boston University Questrom School of Business
- Scott Hempling, attorney
- Val Jensen, Commonwealth Edison
- Steve Kihm, Seventhwave
- Commissioner Nancy Lange, Minnesota Public Utilities Commission
- Sergej Mahnovski, Consolidated Edison
- Kris Mayes, Arizona State University College of Law/Utility of the Future Center
- Jay Morrison, National Rural Electric Cooperative Association
- Allen Mosher, American Public Power Association
- Sonny Popowsky, Former consumer advocate of Pennsylvania
- Karl Rábago, Pace Energy & Climate Center, Pace University School of Law
- Rich Sedano, Regulatory Assistance Project
- Chair Audrey Zibelman, New York State Public Service Commission
- Peter Zschokke, National Grid

Webinar Housekeeping Items

- We're recording the webinar and will post it on our web site.
- Because of the large number of participants, everyone is in *listen* mode only.
- **Please use the chat box** to send us your questions and comments any time during the webinar. You may want to direct your question to a specific author.
- The report authors will each have 15 minutes to present.
- Moderated Q&A will follow, with the report authors responding to questions typed in the chat box.
- The report and webinar slides are posted at **feur.lbl.gov**

About the Authors (in order of presentation)

Lisa Wood is Vice President of The Edison Foundation and Executive Director of the Institute for Electric Innovation. Previously, Wood was a Principal with The Brattle Group, a Principal with PHB Hagler Bailly, and a Program Director at RTI International.

Ross C. Hemphill is an independent consultant on regulatory and energy policy issues. His career over more than 35 years has been devoted to energy and regulatory policy with a primary focus on ratemaking theory and practice. Hemphill has worked for utilities, research institutions and regulatory agencies, both directly and as a consultant. Most recently, he was vice president of Regulatory Policy & Strategy for Commonwealth Edison.

John Howat has been involved with energy programs and policies since 1981, including the past 17 years at National Consumer Law Center. Previously, he served as Research Director of the Massachusetts Joint Legislative Committee on Energy, Economist with the Electric Power Division of the Massachusetts Department of Public Utilities, and Director of the Association of Massachusetts Local Energy Officials.

Ralph Cavanagh is co-director of Natural Resources Defense Council's energy program, which he joined in 1979. Cavanagh has been a Visiting Professor of Law at Stanford and University of California-Berkeley Law School and a Lecturer on Law at Harvard Law School. He also has been a faculty member for the University of Idaho's Utility Executives Course for more than 20 years. From 1993 to 2003 he served on the U.S. Secretary of Energy's Advisory Board.

Severin Borenstein is E.T. Grether Professor of Business Administration and Public Policy at the Haas School of Business and a Research Associate of the Energy Institute at Haas. He also is Director emeritus of the University of California Energy Institute (1994-2014) and the Energy Institute at Haas (2009-2014). His research focuses on business competition, strategy and regulation. He has served on numerous committees and boards for state and federal governments.

Jeff Deason and **Lisa Schwartz** wrote the literature review (chapter 5) in the report, not covered in this webinar.

Four Perspectives on Fixed Cost Recovery

	Wood/Hemphill (utility)	Howat (consumer)	Cavanagh (environmental)	Borenstein (economist)
Higher fixed charges	◒	○	○	◒[1]
Minimum bills	○	●	●	○
Demand charges	◒	○	◒[2]	○
Time-varying rates	○	●	●	●[3]
Tiered rates	○	●	●	○
Revenue decoupling	○	●[4]	●[5]	○
Frequent rate cases	◒[6]	◒	○	○
Formula rate plans	●	◒[7]	◒	○
Lost revenue adjustment mechanisms	○	○	○	○

○ **Poor** ◒ Better ◒ Good ● Preferred

[1] First set volumetric price to reflect actual social marginal costs, including costs of externalities whether or not the utility has to pay those costs.
[2] Linked to periods of coincident peak and subject to negotiated resolution of important technical issues.
[3] Reflecting full social marginal cost, with the remaining revenue requirement balanced between higher volumetric rates and higher fixed charges.
[4] Assuming a number of safeguards are implemented (see report).
[5] Necessary but not sufficient.
[6] In combination with a formula rate plan and only for setting revenue requirement; rate design issues to be addressed less frequently (e.g., every three years).
[7] Implementation of formula rates should not deny utility customers and other stakeholders the ability to periodically review and litigate a utility's cost structure.

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Providing a Regulatory Path for the Transformation of the Electric Utility Industry

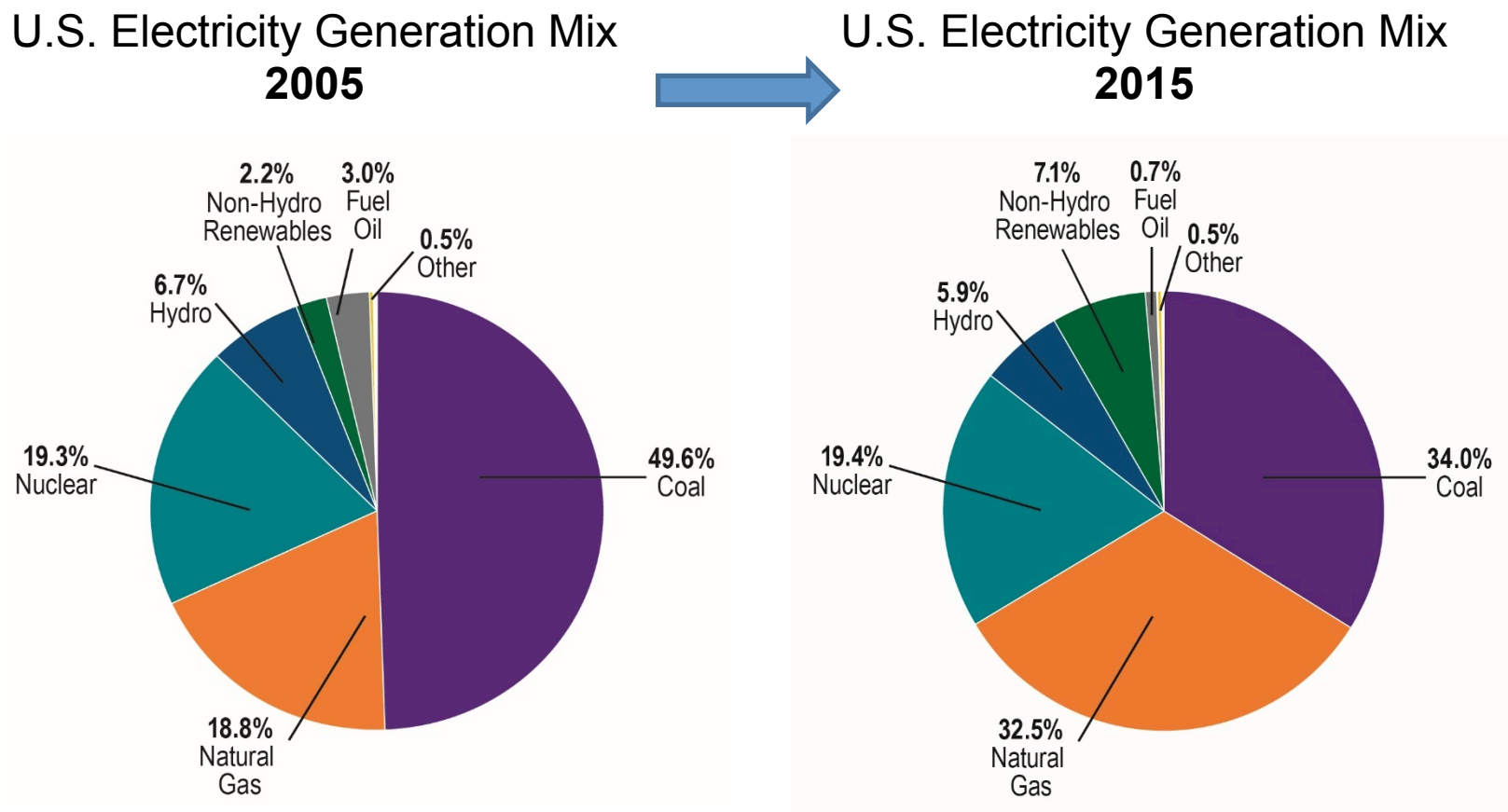
Lisa Wood, Executive Director
Institute for Electric Innovation
Ross Hemphill
RCHemphill Solutions LLC

The Edison Foundation
INSTITUTE for ELECTRIC INNOVATION

Three key trends in electric power industry are important today!

- Major transition to clean energy
  - U.S. carbon emissions are **20%** below 2005 levels as of EOY 2015
  - U.S. carbon emissions *were* **15%** below 2005 levels as of EOY 2014
- More digital and distributed power grid
  - Digitization of the power industry is well underway
  - Distributed energy resources are growing exponentially
  - Big data: how are data being used to generate value?
- Individualization of customer services
  - From large corporations with sustainability goals to residential customers who want to buy into solar or manage their energy
  - "As a service" businesses

Trend 1. Major transition to cleaner energy in 10 years in U.S. generation mix (EIA)



Trend 2. Power grid becoming more digital and complex and integrating more distributed energy resources

Nearly

SMART METERS
give half of all U.S. households more control and flexibility

Electric power companies are investing

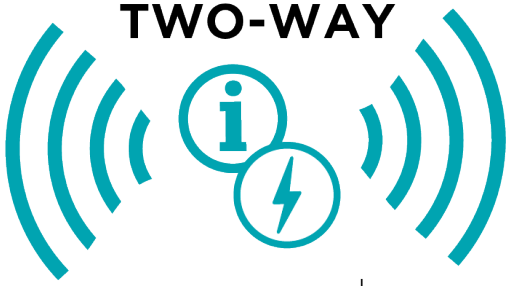
MORE THAN

$20B

annually in the distribution grid

Digital grid enables

TWO-WAY

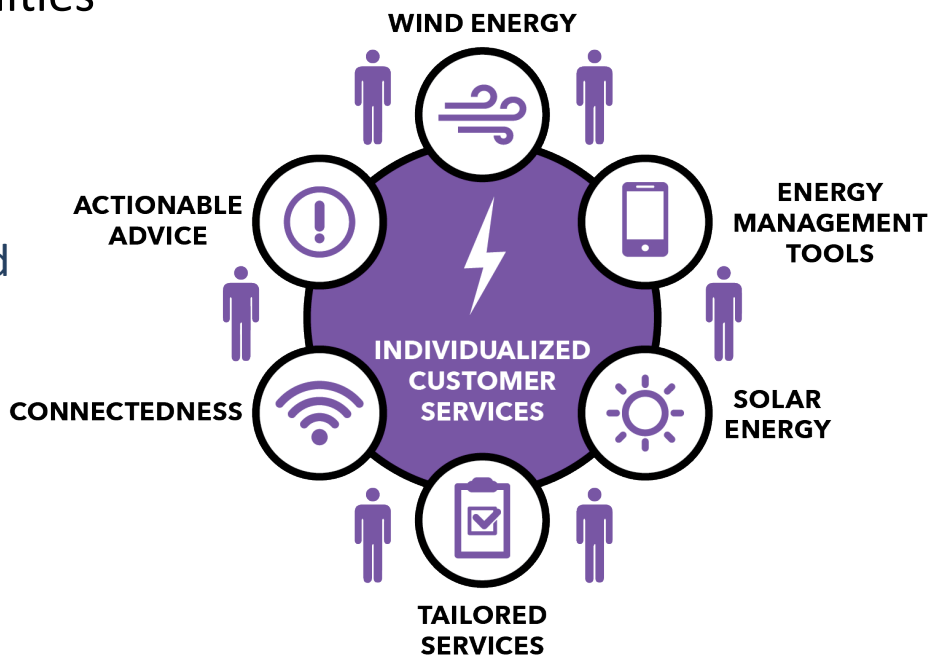


power and information flows

Note: Industry capex $103.3 billion in 2015

Trend 3. Individualization of customer services

- Large corporations with sustainability goals – increasingly signing contracts with utilities for 100% renewable energy. More than RECs
  - energy + RECs
  - State policy issue: are the resources and tariffs in place to offer these services?
- Residential solar options: private and utility-offered solar
  - State policy issue: who can offer which types of solar to customers?
- New businesses offering services
  - Edison Energy - Energy as a service model
  - *Current* - GE's new energy business



Regulations and policies will facilitate or block the pace of change in these areas

- As we transition to a clean energy future, how is the utility business model changing?
- As the power grid becomes increasingly digital and distributed
  - How do we value & price the power grid?
  - How do we value & price distributed energy resources?
- As customers demand more individualization of services, how must regulation change to allow flexibility in offering services?
  - At minimum, critical to begin to price grid services appropriately

Guidelines for pricing grid services

- Approaches we ***recommend*** and why
  - Formula ratemaking approaches
  - Appropriate cost-based approaches
    - Fixed charges
    - Demand charges
- Approaches we ***don't recommend*** and why
  - Decoupling
  - Lost revenue adjustment mechanism (LRAM)
  - Minimum bill

Recommended: Formula ratemaking

- An approach to setting the appropriate level of revenue recovery on an annual basis through a streamlined regulatory process. Using Illinois as an example:

- It is streamlined due to three components of the process:
  1. Allowed return on equity is a simple arithmetic calculation using known and transparent inputs;
  2. Cost allocation and rate design are not part of the process; and
  3. Determination of a number of issues frequently litigated is settled by law.

Formula ratemaking II

- Illinois Approach: Simple and methodical
  - Utilities required to make filings each year by May 1 to set rates starting January 1 of following calendar year
  - For example, filing May 1, 2016, will be for rate year starting January 1, 2017
  - Commission has 240 days to make decision
  - All steps in a normal rate case take place prior to Commission decision
- Updated cost information each year using FERC Form 1
- Reconciliation of previously approved revenue requirement using updated information
- Illinois is in the 5th year of this formula process

Formula ratemaking III

- How has this worked? Results after 5 years in Illinois:
  - Critical infrastructure investments are being made
  - Reliability and customer service performance are at historic highs
  - Customer satisfaction continues to climb
  - Total (all-in) electric rates remain at or below inflation rate
- AMI deployment is ahead of schedule
  - Over 20 million manual meter reads have been eliminated thus far – and smart meter deployment has just exceeded 50%.
  - Because of the formula, these savings flow back to the customers every year with the annual filing.

Recommended cost-based pricing approaches

- Fixed Charges – one cost-based approach
  - Transparency in pricing grid services: Move toward fixed and variable charges that are commensurate with fixed and variable costs
  - Current fixed charges (e.g., customer charges) are far below level of fixed costs incurred by utilities
    - For example, fixed costs for ComEd are almost 50% of customer bill yet most of this is collected via volumetric charge (not customer charge)
    - Some stakeholders are opposed to charging directly for fixed costs.
- Demand Charges – another cost-based approach
  - C&I customers have had demand charges in place for long time
    - Rewards higher load factor consumption behavior
    - Incentivizes demand response and energy efficiency as customers respond to price signals to reduce their bills
    - But, may be **very difficult** to communicate to residential customers

Approaches not recommended

- Revenue decoupling & LRAM approaches
  - Ex post adjustment (or true-up mechanism) that assures fixed cost recovery when energy sales decline (e.g., typically used for energy efficiency)
  - Although decoupling works for EE, the cost shift for DG is much greater per customer. Hence, decoupling exacerbates the well-known DG cost shifting issue!
- Minimum bill
  - Fixed-variable price signals remain the same but the customer pays a minimum bill each month
  - Not transparent to customer (e.g., full cost of grid services not shown)
  - Quite similar to current customer charge with same issues since minimum bill amount unlikely to recover full cost of grid services

Final thoughts

- Electric utility companies provide both *grid services* and *energy services* today
  - Yet, great reluctance to charge for grid services directly!
- What is the way forward?
  - Adopt *transparency in pricing* for grid services and energy
  - Many options and approaches – we described a few
    - Formula ratemaking (e.g., Illinois)
    - Charging directly for fixed costs (e.g., increase customer charge)
    - Demand charges
- Why is this important now?
  - As number of distributed energy resources continues to grow, power grid is increasingly important as the integrator and enabler of DERs
  - Critical to price grid services right!

For more information

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A Consumer Advocate's Perspective on Electric Utility Rate Design Options for Recovering Fixed Costs in an Environment of Flat or Declining Demand

John Howat
National Consumer Law Center

The Utility Industry in Transition: The more things change …

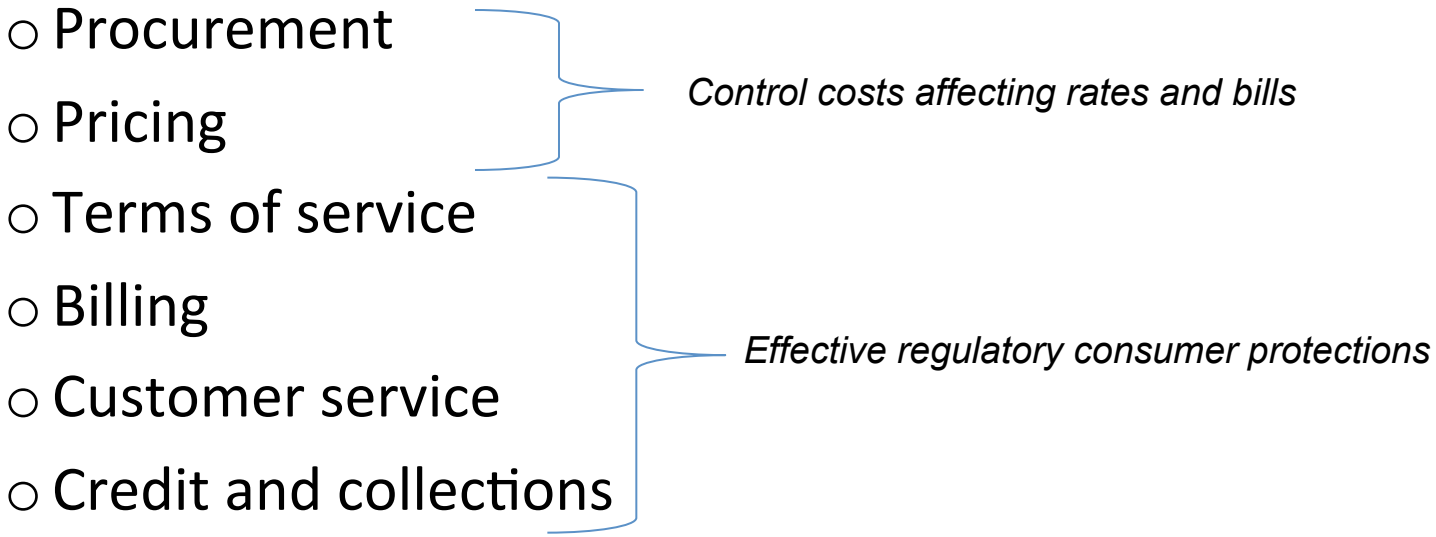
- Generation and end-use technologies and economics
- Advanced communication capabilities
- Flat or declining sales
- Utility business model assumptions
- Regulatory models and assumptions?

… the more they stay the same

- Home energy service remains a basic necessity of life
  - End uses
    - Heating
    - Cooling
    - Lighting
    - Refrigeration
    - Communication
  - Uninterrupted access required to ensure health, safety, and effective societal participation
- Home energy costs and benefits are regressively distributed

Underlying Assumptions and Biases

- To ensure uninterrupted access to affordable home energy service:
  - Retain effective regulatory oversight of utility



Underlying Assumptions and Biases (cont.)

- To ensure uninterrupted access to affordable home energy service:
  - Preserve the long-term viability of utility distribution companies that retain the obligation to serve all customers
- Energy efficiency is the least-cost, premium energy resource
- The utility "throughput incentive" is counterproductive to implementation of effective energy efficiency programming.

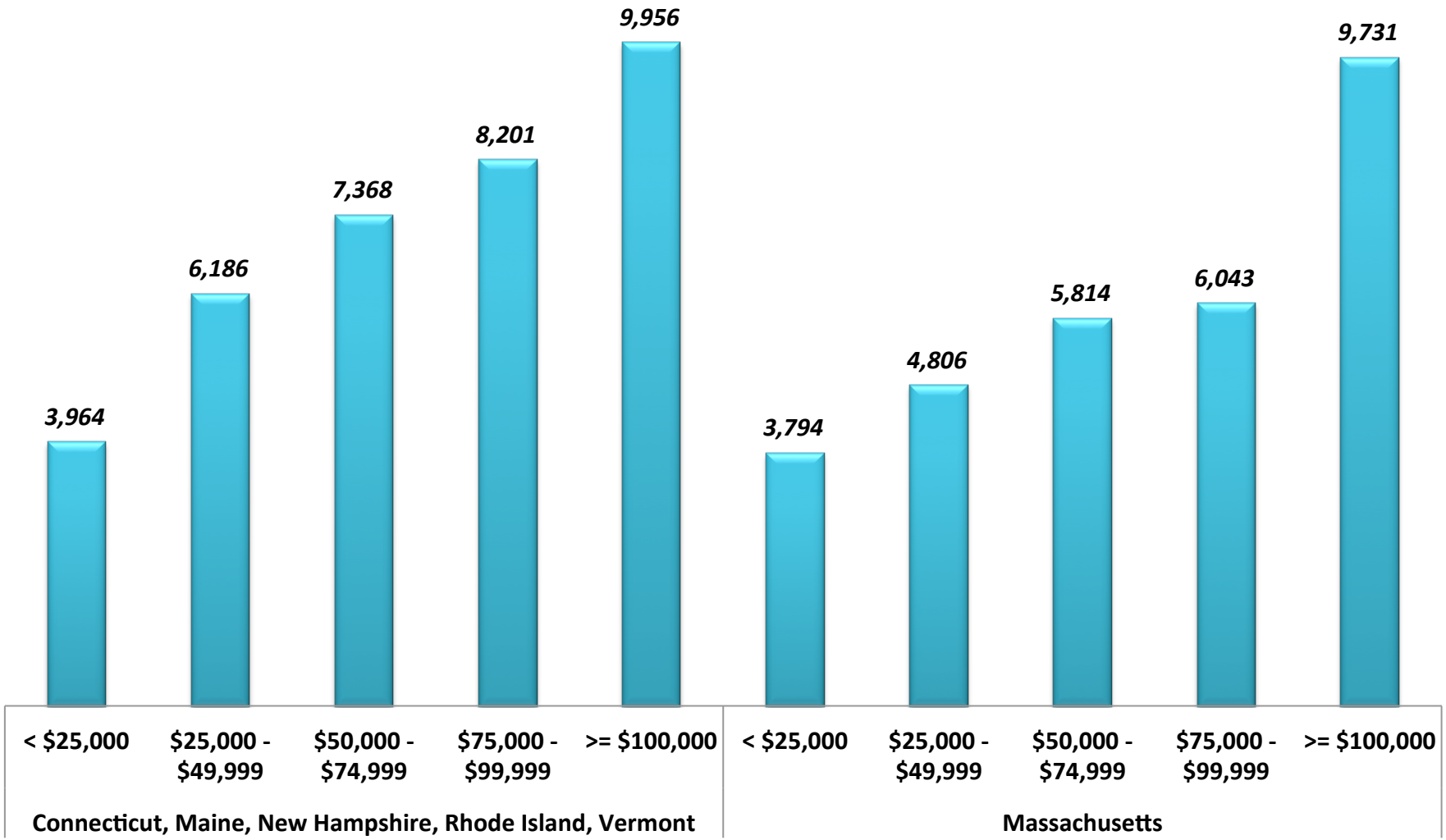
Increased Fixed Customer Charges

- Since 2014 electric utilities in at least 34 states have proposed to shift recovery of revenue requirements from volumetric charges to monthly fixed, customer charges.
- Intra-class cost shift
  - Shifts costs within a rate class from high-volume consumers to low-volume consumers within a rate class
  - Data demonstrates that in nearly all regions of the US electricity usage is below the residential class average for:
    - Low-income households
    - Elder households
    - Households of color
- Diminished efficiency incentive and customer control over the bill

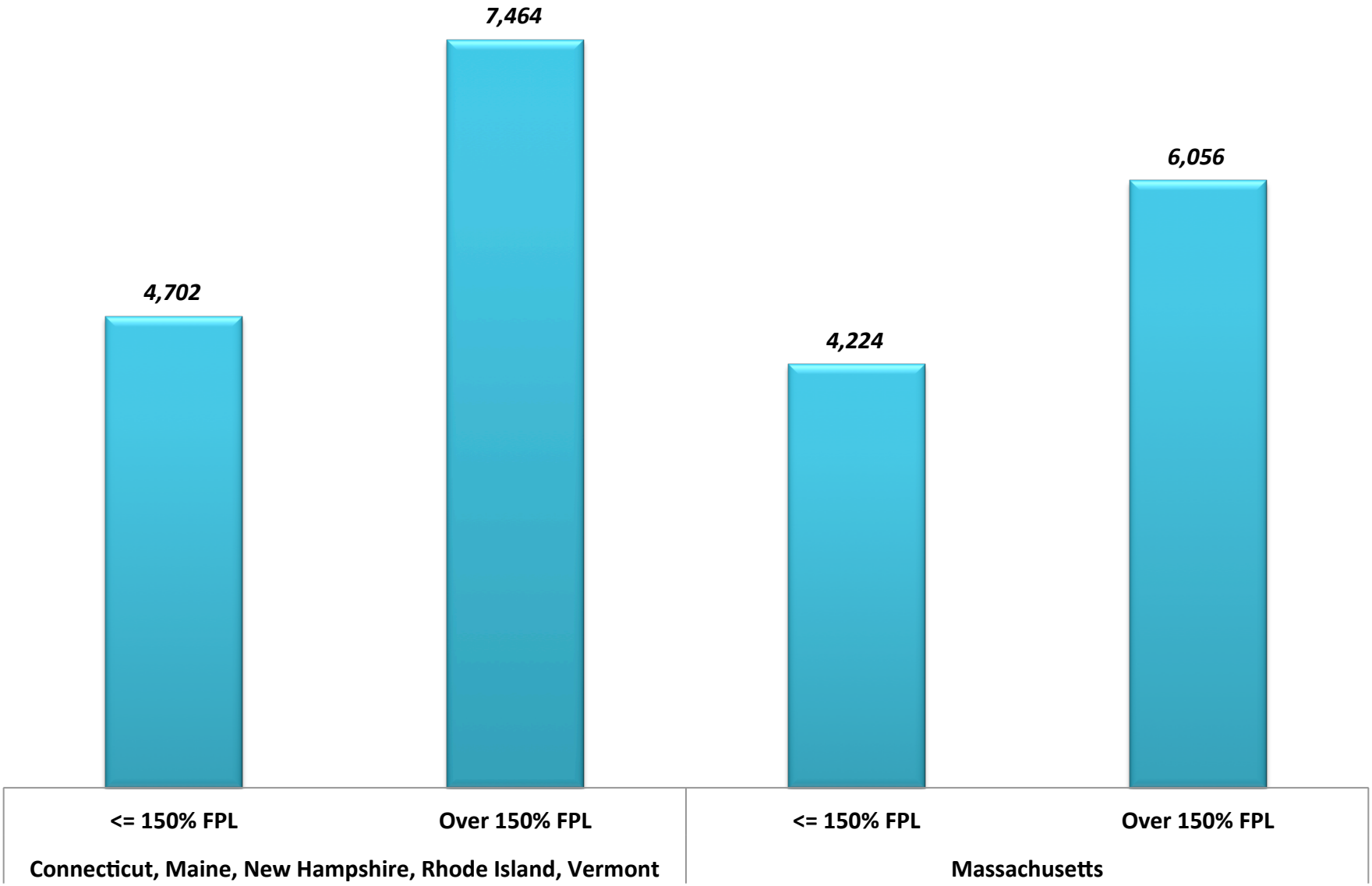
Madison Gas & Electric Company - Comparative Bill Impact: Low, Average and High-Volume Residential General Service Customers

	Low-volume Customer	Average-volume Customer	High-volume Customer
Monthly Usage (KWH)	450	900	1400
Initial Monthly Customer Charge	$10.44	$10.44	$10.44
Revised Monthly Customer Charge + Grid Connection Charge	$19.00	$19.00	$19.00
Initial Volumetric Charge	$0.13992	$0.13992	$0.13992
Revised Volumetric Charge	$0.12986	$0.12986	$0.12986
Initial Monthly Bill	$73.40	$136.37	$206.33
Revised Monthly Bill	$77.44	$135.87	$200.80
$ Increase	$4.03	($0.49)	($5.52)
% Increase	5.5%	-0.4%	-2.7%

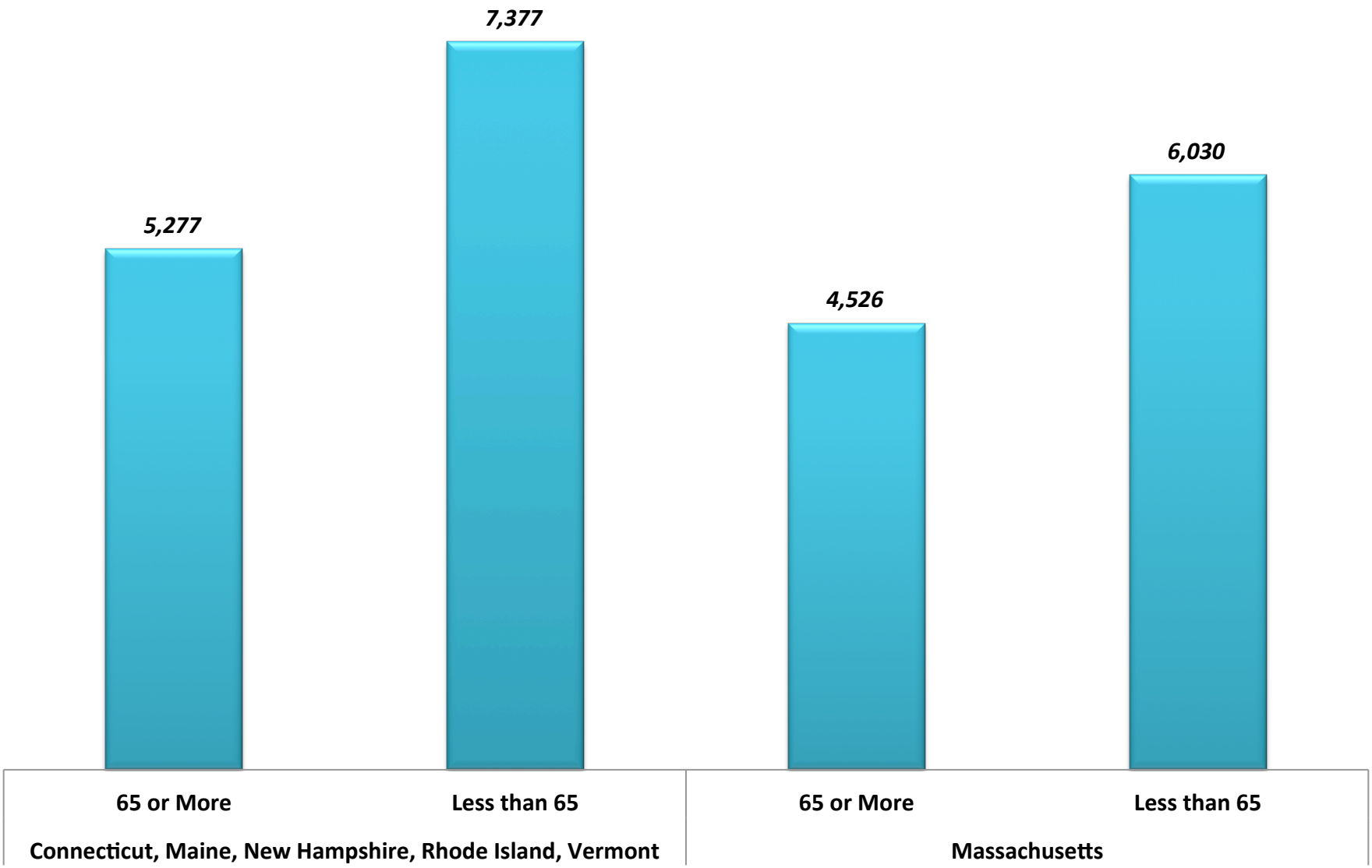
Median 2009 Residential Electricity Usage (KHW) by Income Category: MA and CT/ME/NH/RI/VT



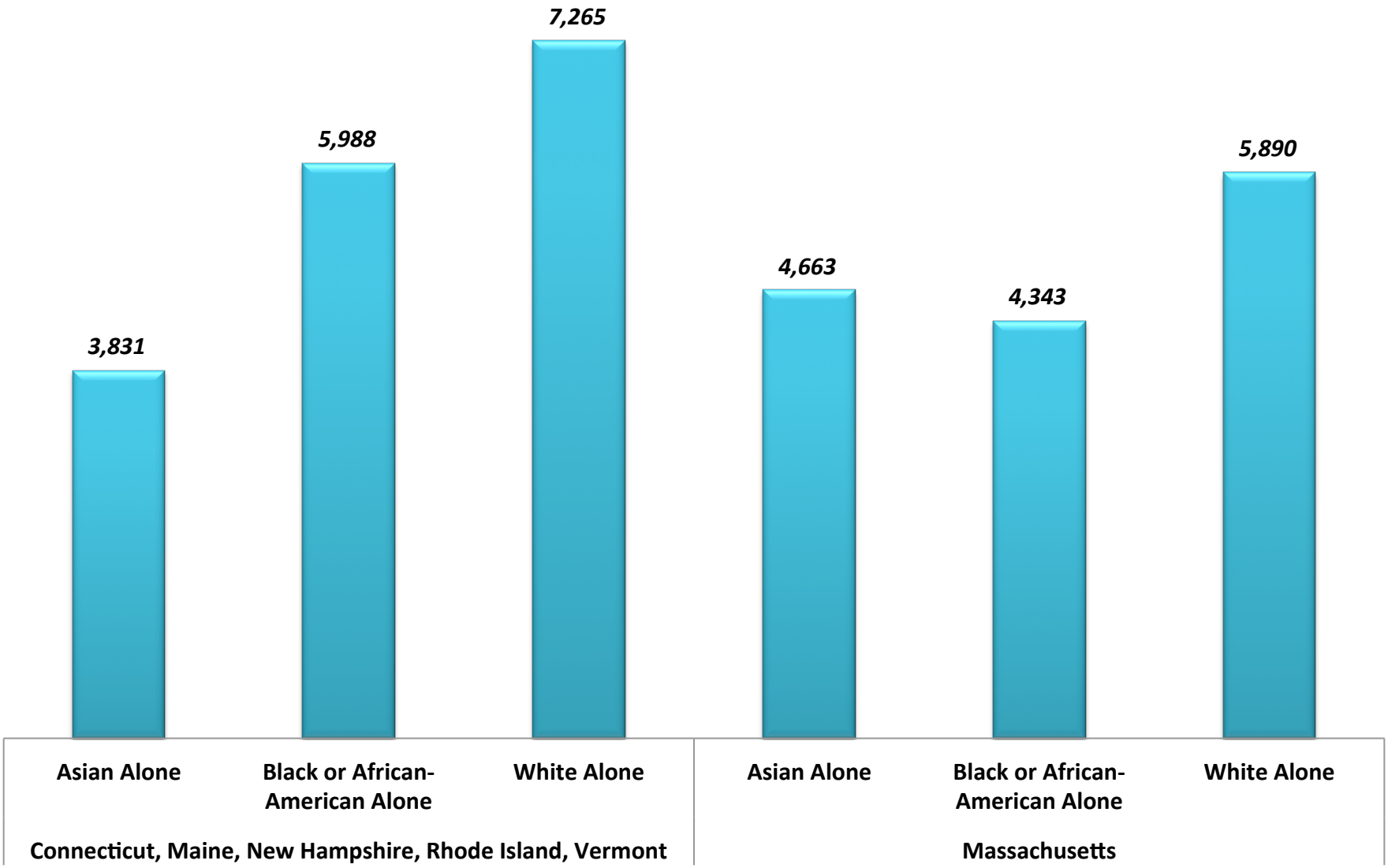
Median 2009 Residential Electricity Usage (KHW) by 150% Poverty Status: MA and CT/ME/NH/RI/VT

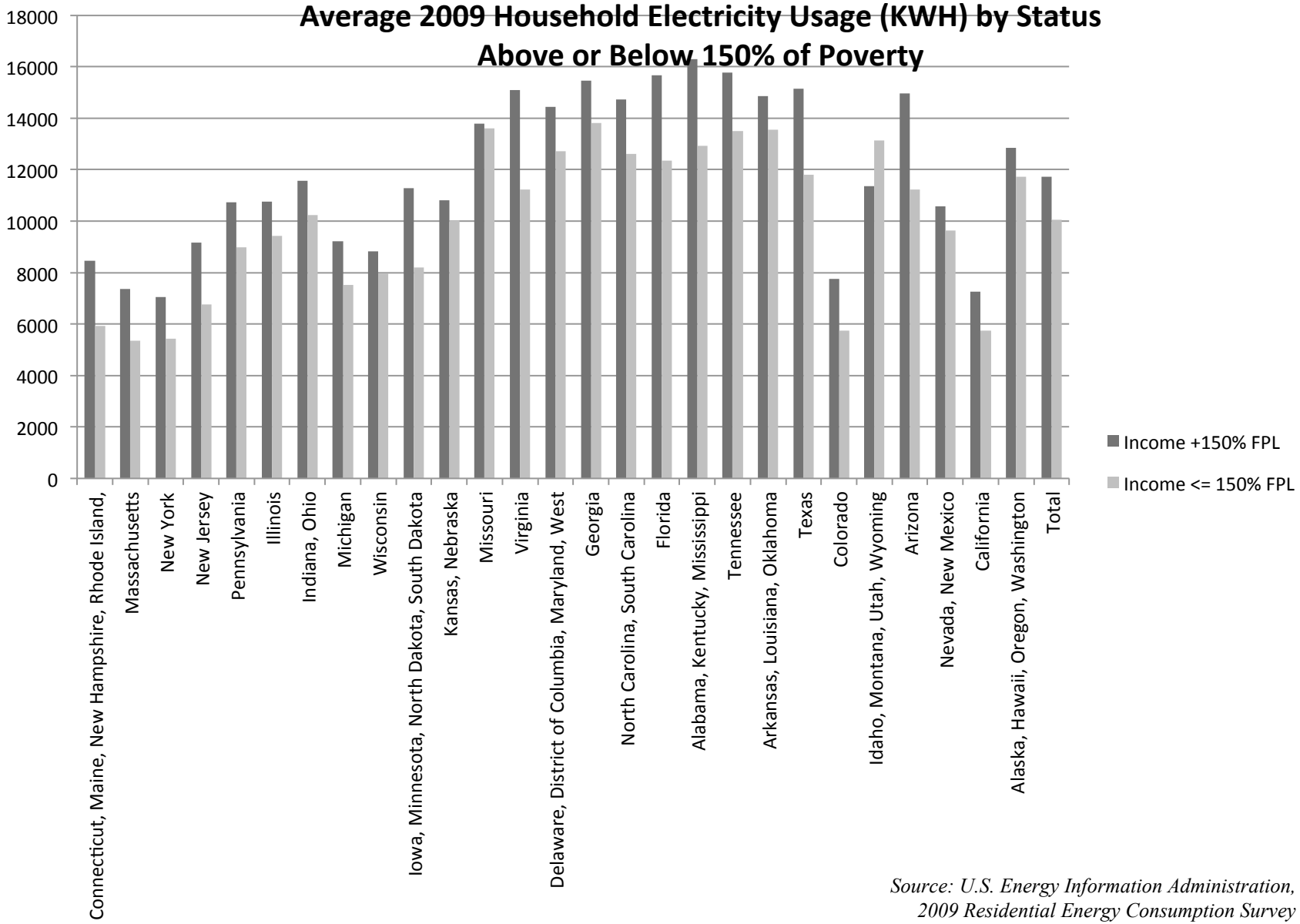


Median 2009 Residential Electricity Usage (KHW) by Age of Householder: MA and CT/ME/NH/RI/VT



Median 2009 Residential Electricity Usage (KHW) by Race of Householder: MA and CT/ME/NH/RI/VT





Source: U.S. Energy Information Administration, 2009 Residential Energy Consumption Survey

Revenue Decoupling - Abridged Catalog of Consumer Advocate Objections and Concerns

- Loss of ability to litigate a utility's cost structure
  - Tracker/rider approach to regulation
  - Revenues do not necessarily track costs
- Utility risk mitigation with no commensurate benefit to consumers
- Increased price volatility
- Proposed as mechanism to promote energy efficiency
  - No direct link to utility EE investment level
  - EE mandated by statute in many states so no need for decoupling
- Increased customer confusion ("The less I use the more I pay?")

Decoupling Design Elements to Protect Consumers and Address Advocates' Concerns

- Regulatory review of utility cost structure to reset the revenue baseline
  - Incorporate appropriate mechanism to account for modified utility risk profile
  - Timing and approach controversial
  - Regular true-up of undepreciated value of utility capital investments
  - Full rate case every 3 years?
- Cap/collar on upward price adjustments
- Limit cost adjustments between rate cases
  - # customers
  - O&M
- Commitments regarding targeted EE investment and implementation
  - Commitments above and beyond pre-existing mandates
  - e.g., hard to reach residential customers, whole-house, deep residential retrofits
- Combine with proposal to implement inclining block rate structure
  - Surcharge to tail block
  - Surcredit to initial block

Time-varying rates

- *IF PROPERLY DESIGNED AND IMPLEMENTED*, may allow some individual customers to reduce energy bills
  - Potential for adverse impacts on consumers with less ability to shift usage
    - Appliance inventory
    - Usage needs and patterns
    - Access to energy efficiency, generation and management resources
- In 2015, 52M residential smart meters among 123M US households
- Absent ARRA funding, new AMI deployment has slowed considerably

TVR Variants and Residential Consumers

- Time-of-Use (TOU)
  - Preset in tariff, vary predictably by time of day or season
    - Most predictable
- Critical peak pricing (CPP)
  - Pre-set pricing for specified # of days or hours during peak months
    - Less predictable
- Real-time pricing (RTP)
  - Tied to wholesale power markets
    - Least predictable

AMI Essential Consumer Protections

- Costs
  - Smart meter proposals must be cost-effective
  - Utilities must share the risks associated with investments in new technologies
- Planning Framework
  - Consider full range of alternatives available to meet predetermined policy goals and objectives
    - e.g., regulators should assess for cost-effectiveness all alternatives to AMI to meet system peak reduction goals, such as direct load control programs
- Pricing
  - Time-based or dynamic pricing must not be made mandatory – opt-in
  - Any new dynamic pricing structure should be rolled out with "shadow billing" and low-income "hold harmless" provisions
  - Pre-paid service should not be allowed – especially in low-income households
- *See "Additional Slides" at end of webinar slide deck*

Other Rate Design Options

- Minimum Bills
  - Minimum consumption level
  - Minimum bill amount
- Residential Demand Charges
  - Consumer control/response
  - Coincident – non-coincident charges
  - See time-varying rates concerns
- Formula Rates
  - Performance standards
  - Does not mitigate consumer interest in periodically litigating utility cost structure

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John Howat: jhowat@nclc.org

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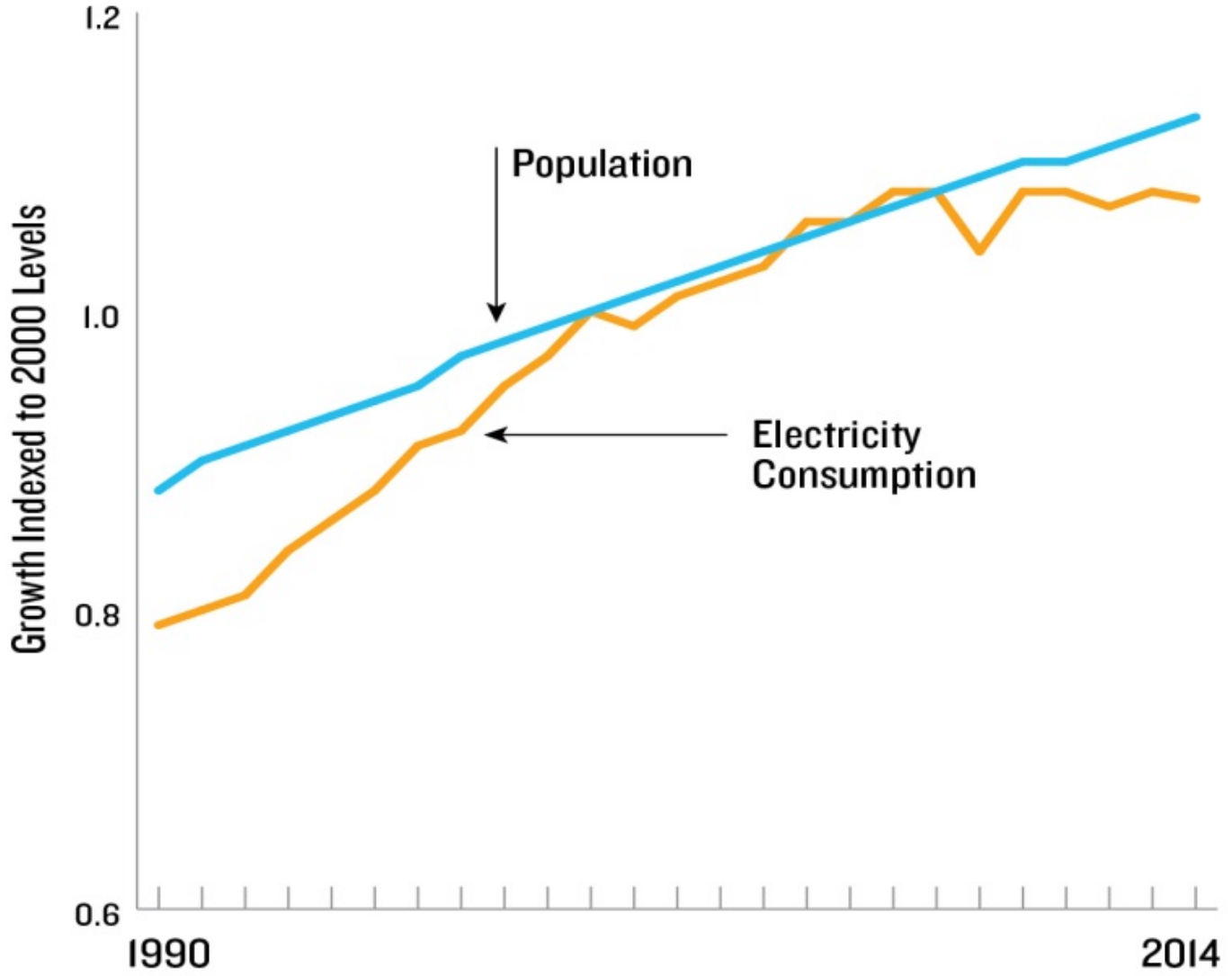
Environmentally Preferred Approaches for Recovering Electric Utilities' Authorized Costs of Services: Options for Setting and Adjusting Electricity Rates

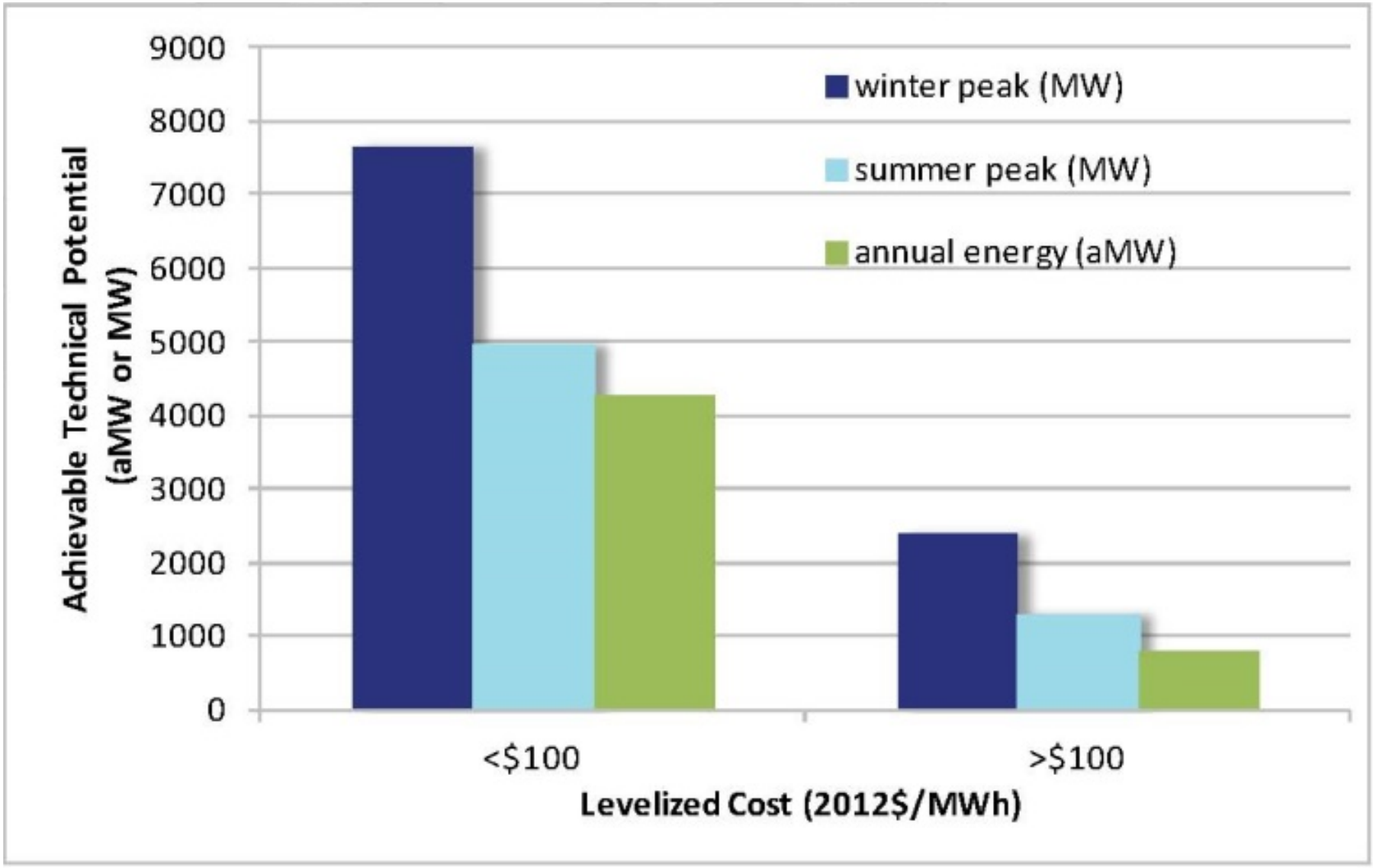
Ralph Cavanagh
Natural Resources Defense Council

Figure 1. Growth in National Electricity Consumption and Population



NRDC
NATURAL RESOURCES DEFENSE COUNCIL

Figure 2. Peak and Energy Impacts by Levelized Cost Bundle for 2035 – Northwest Power and Conservation Council



Northwest Power and Conservation Council, Seventh Northwest Conservation and Electric Power Plan, Chapter 12: Conservation Resources, p. 12-6, https://www.nwcouncil.org/media/7149675/7thplandraft_chap12_consvres_20151020.pdf

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The Economics of Fixed Cost Recovery by Electric Utilities

Severin Borenstein
Haas School of Business and Energy Institute at Haas
University of California, Berkeley

Why is there a Cost Recovery Problem?

- Because prices matter
  - *For Economic Efficiency* – prices that deviate from full social marginal cost create deadweight loss, i.e., reduce the total wealth created in the economy
  - *For Equity* – particularly the sense that fairness suggests large-quantity consumers should pay more towards recovering a revenue shortfall than small-quantity consumers
  - *For Income Distribution* – with concern about a widening income inequality, desire to assure that low-income households can afford basic necessities such as energy

- As supply and energy efficiency options grow
  - tariff policy can no longer focus only on equity and distribution
  - volumetric sales decline, making existing tariffs less sustainable

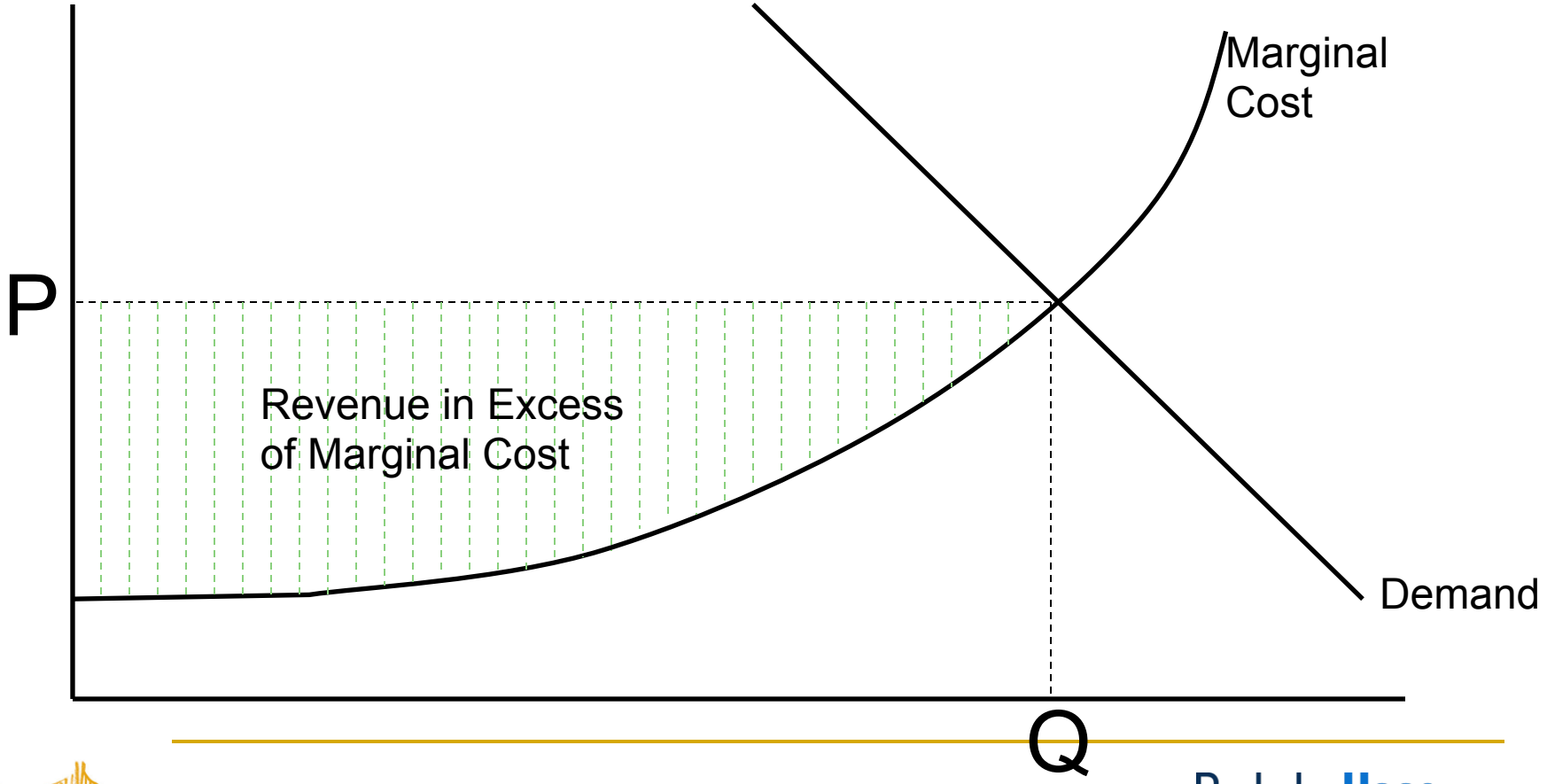
Why we care about efficient pricing: setting price equal to social marginal cost

- Departures from efficient pricing cause behavior that reduces economic value creation
- Price greater than social marginal cost discourages consumption that creates value
  - If SMC=$0.10, but utility charges P=$0.20, discourages consumption that creates value
    - Makes cost of charging an electric vehicle gasoline equivalent price of $3.15/gallon rather than $1.58/gallon
    - Or discourages outdoor lighting that improves safety
- Price below SMC encourages overuse
  - Setting P<SMC encourages insufficient energy efficiency and wasteful use

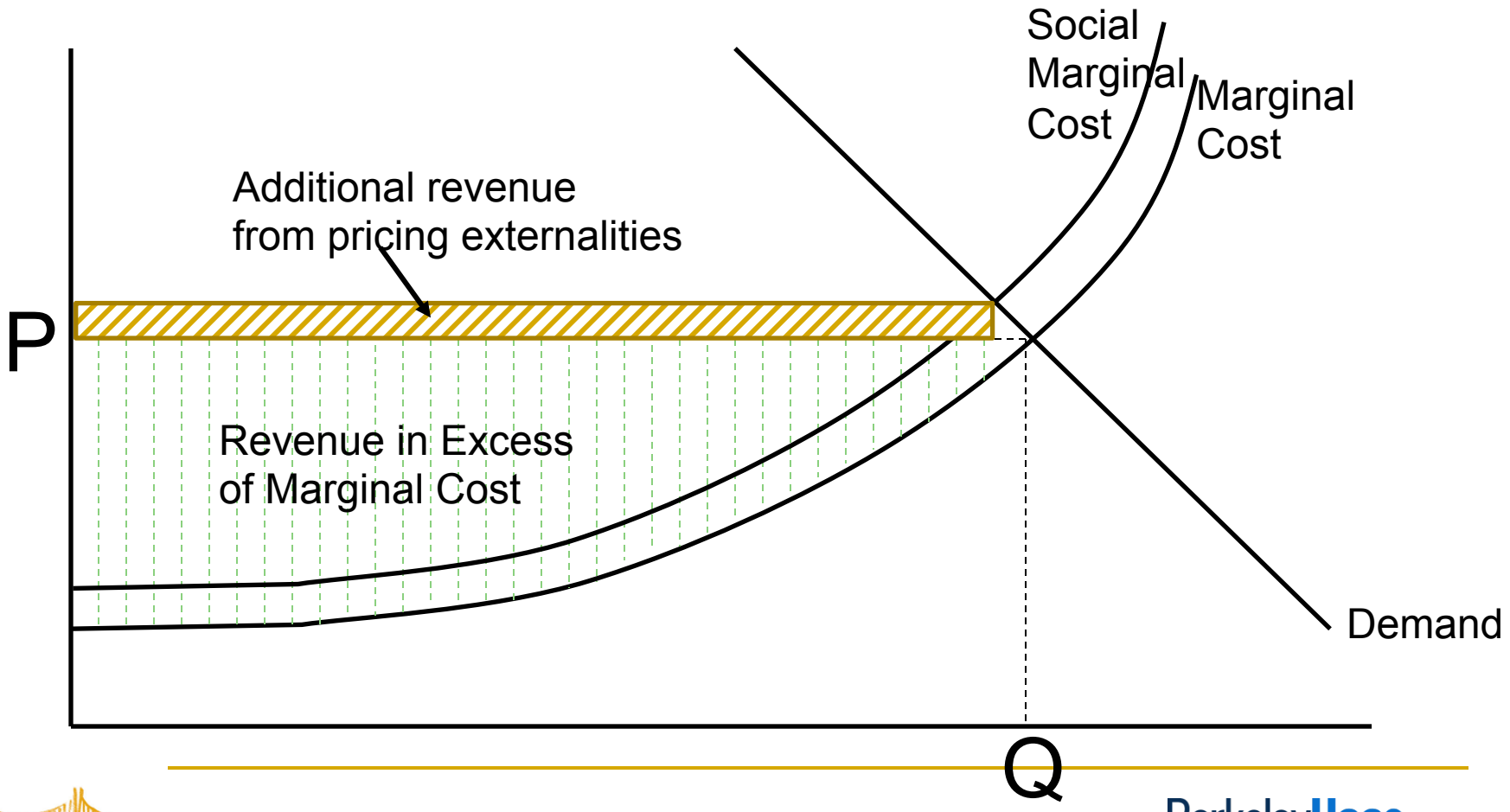
So, start from setting volumetric price to reflect social marginal cost

- *Social* => includes costs of externalities whether or not the utility has to pay those costs
  - If utility doesn't have to pay, pricing externalities is still efficient, and it raises additional revenue
- *Marginal cost* =>
  - Short-run MC: electricity price is time-varying
  - Does not include costs that are sunk or fixed at that time
  - But that DOES NOT mean that setting p=SMC generates no revenue towards paying fixed and sunk costs

Efficient pricing will generate revenue towards fixed and sunk costs



More so if externalities are not paid by utility, but still priced in electricity



But for most utilities, efficient pricing will still yield revenue shortfall

- Because much of distribution costs are fixed relative to quantity of electricity consumed
- Because utility revenue covers many other costs that are not marginal
  - Low-income, DG and EE programs. Expensive past contracts.
- Because reduced quantity means low SMC
- Plus declining demand due to DG and EE makes the revenue shortfall greater
  - *Because* price is set above MC, so decline in quantity reduces net revenue

Options for Recovering Revenue Above Efficient Time-Varying Pricing

- Average Cost Pricing
  - Recover all additional revenue from flat volumetric adder
- Fixed Charge (independent of quantity consumed)
- Tiered Pricing
  - Increasing-block or Decreasing-block pricing
- Minimum Bills
- Demand Charges
  - Traditional definition: customer non-coincident peak usage
  - New usage: customer non-coincident usage during peak period
- Frequent rate cases or Decoupling

Fixed Charges

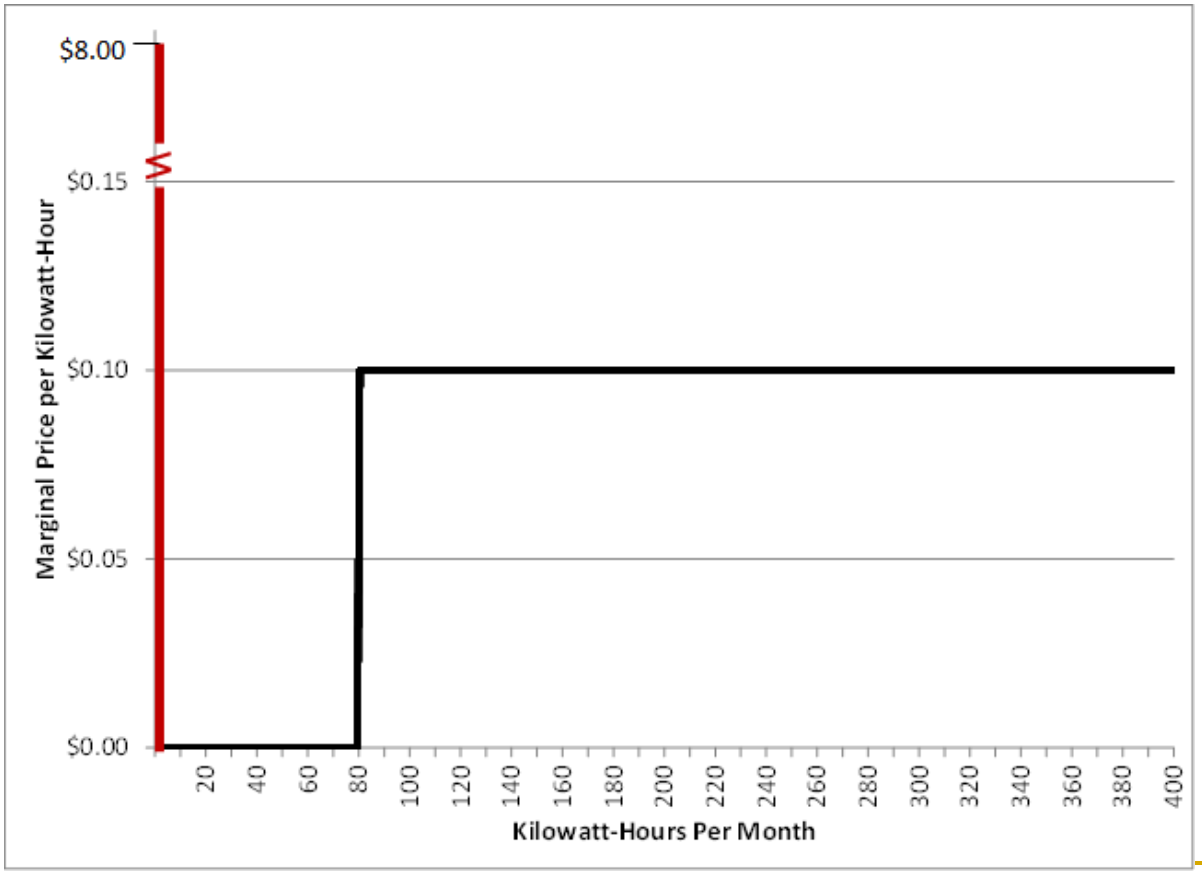
- Very attractive on efficiency grounds because almost no elasticity of connection in response
- But real issues of equity
  - Should my home's fixed charge be the same as Google's?
  - Distinction based on usage means it's not a fixed charge
- Concern about impact on low-income consumers
- Claim that "Fixed costs should be recovered with fixed charges" has no basis in economics

Tiered Pricing

- Possible to combine with time-varying pricing, but tariff can be complex
  - e.g., time-varying energy pricing combined with tiered adder price
- Increasing-block redistributes income, but
  - Very poorly targeted way of helping low-income
  - Equity issue when no adjustments for number of occupants
  - Some customers' prices deviate greatly from SMC
- Decreasing-block
  - A midpoint between fixed charge and flat volumetric pricing
  - Possibly viewed as more equitable than fixed charge
  - Can make efficiency sense if SMC is lower than P needed to meet revenue requirement

Minimum Bill is never the best option

- A minimum bill is identical to a fixed charge plus free electricity



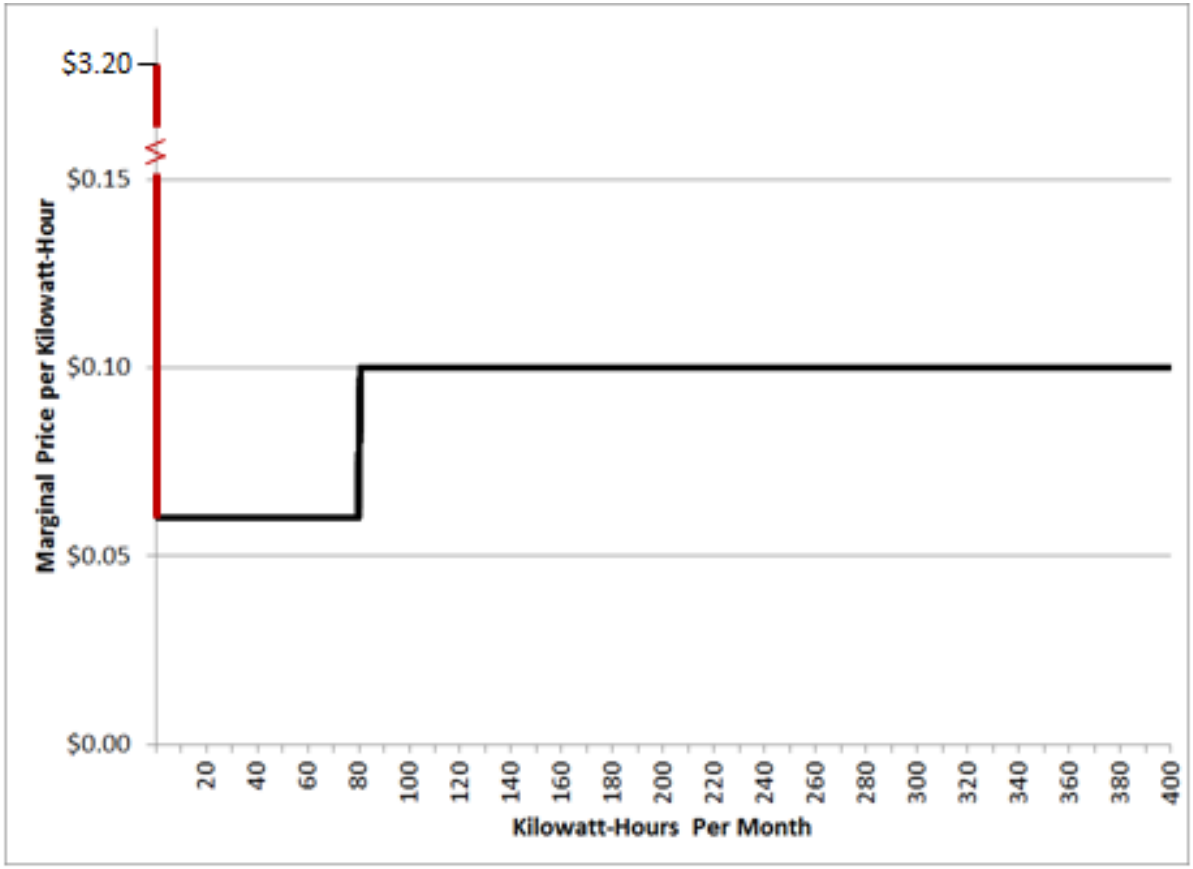
P=$0.10/kWh and minimum bill=$8

is identical to

Fixed Charge=$8, 80 kWh free, then P=$0.10

Alternative to Minimum Bill

- Lower fixed charge, marginal price that reflects the full marginal cost (including pollution externalities)



Instead, if SMC=$0.06, set

F=$3.20

P=$0.06 for first 80kWh

P=$0.10 for more kWh

=> Exact same bill amount for anyone consuming more than 80kWh, slightly lower for less than 80kWh

=> Or, F=$8 and lower marginal price towards efficient level

Demand Charges

- Old “demand charge” – non-coincident peak – had only cost basis in customer’s service level
  - Why not charge directly for service level?
- New “demand charge” – for customer peak usage during peak period
  - An inefficient and more-volatile version of dynamic pricing
- Even peak-period demand charge fails to address actual level of system stress

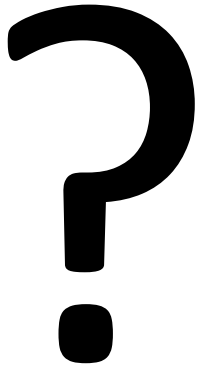
Frequent Rate Cases or Decoupling

- May be potential cause of ***A*** revenue shortfall, but not cause of ***THIS*** revenue shortfall
- Cost recovery when P=social marginal cost raises insufficient revenue is not a problem of regulatory lag
  - and wouldn't go away if lag did
- Very important to identify what problem we are trying to solve

Conclusion

- There is no perfect answer to meeting the revenue shortfall from efficient pricing
- But some answers are a lot better than others
- Fixed charges should play a role, possibly based in part on service levels
- Marginal prices should have to meet real social marginal cost test, not vague goals
- Some old tariff designs – demand charges and minimum bills – may be comfortable, but don't meet the cost-based test

Questions?



Please use the chat box to send us your questions and comments. You may want to direct your question to a specific author.

The report and webinar slides are posted at feur.lbl.gov

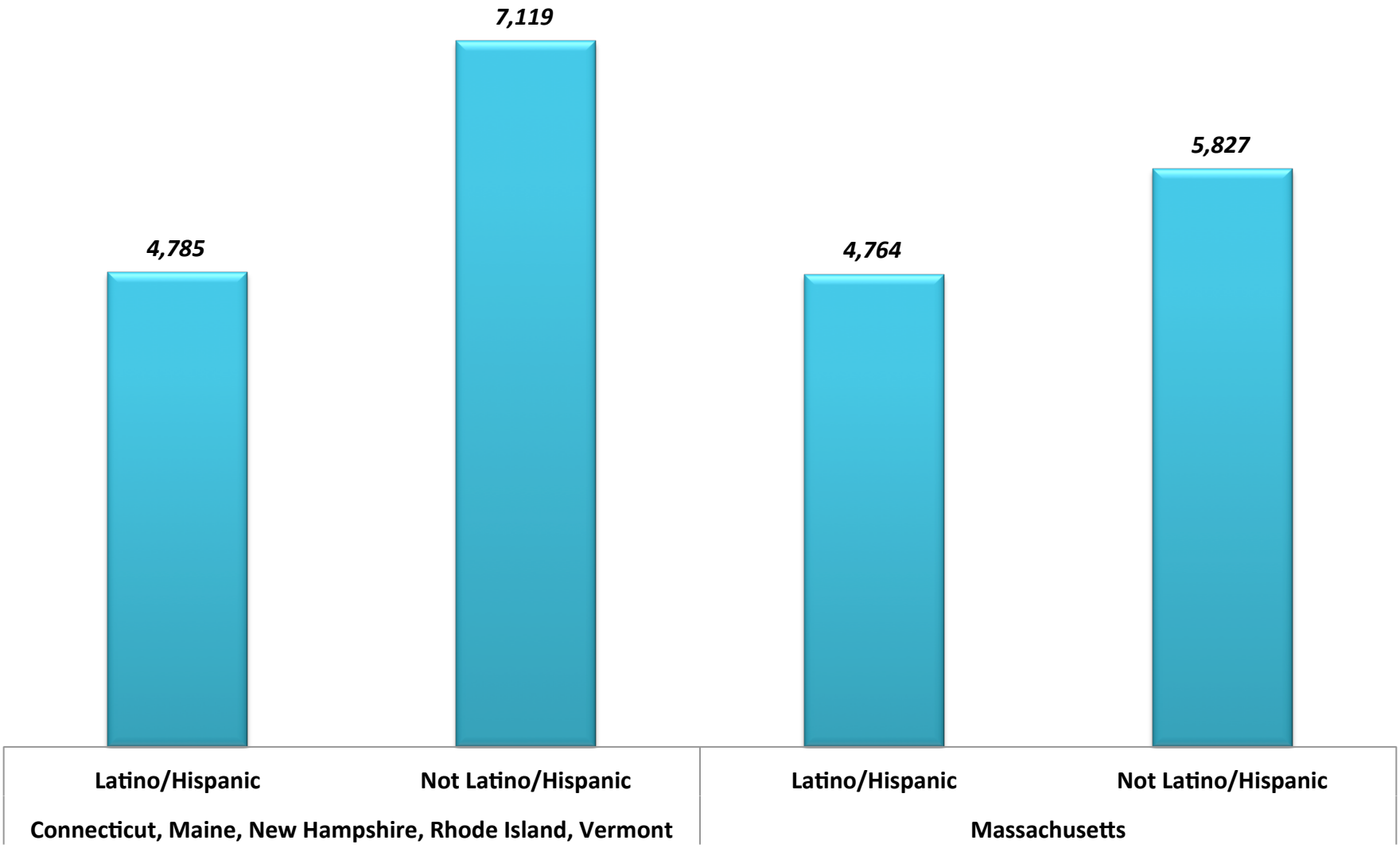
Additional Slides

John Howat, National Consumer Law Center

Electricity Consumption Graphs and Tables

- Website detailing electricity consumption by
  - Income category
  - Race of householder
  - Age of householder
- http://www.nclc.org/energy-utilities-communications/utility-rate-design.html or Google "NCLC rate design"
- U.S. Energy Information Administration – Residential Energy Consumption Survey
- 27 "Reportable Domains"
- Click on state or region on US map

Median 2009 Residential Electricity Usage (KHW) by Ethnicity of Householder: MA and CT/ME/NH/RI/VT



AMI: Consumer Advocate Questions and Concerns

- Cost
  - Is full deployment of smart meters and related communication infrastructure the least-cost means of achieving load reduction and system operations policy objectives?
  - Who assumes the cost risk of AMI investment? Who pays if anticipated utility system benefits do not materialize?
- Dynamic pricing winners and losers
  - Will consumers less able to respond to "price signals" be penalized?
- Remote disconnection
  - Will the new ability to shut customers' service off remotely increase rates of low-income household service disconnection?

AMI Essential Consumer Protections

- No degradation of existing consumer protections related to disconnections, notification by mail of disconnections, etc.
- Consumer Education
  - Include comprehensive consumer education and bill protection programs in any evaluation or implementation of smart meters

For More Information on the Series

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